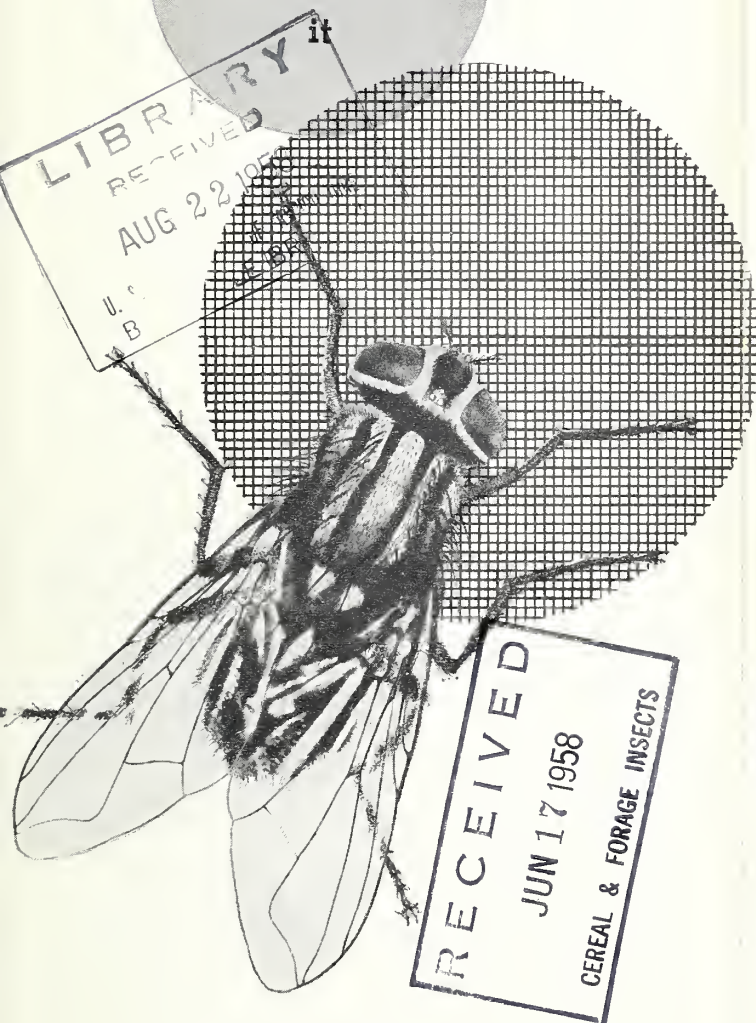


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the HOUSE FLY

how
to control



Leaflet No. 390

U. S. DEPARTMENT OF AGRICULTURE

HOW THE HOUSE FLY ENDANGERS OUR HEALTH



The house fly¹ is a danger to the health of man and animals principally because it carries and spreads disease germs that may be in the materials it breeds in, feeds on, or walks on.

This fly feeds and breeds most extensively in manure, garbage, and fermenting crop wastes. If disease germs are in these materials, or in others that they frequent, the flies get them on their hairy legs and feet and in their digestive tracts. If the flies have access to man's food, they contaminate it by walking over it and by leaving their excreta on it.

By contaminating food and water and by coming in direct contact with the hands and mouth, the flies spread typhoid, dysentery, and diarrhea. They have a part in spreading cholera, yaws, trachoma, and many other diseases. They can transmit the eggs of various parasitic worms.

FLY CONTROL IN THE HOME AND ON THE FARM

To control the house fly in and around the home and on the farm, do these things:

Eliminate the flies' breeding places. Follow sanitary practices constantly. Keep garbage and other refuse under cover; dispose of garbage frequently. On the farm, dispose of manure properly.

Screen windows and doors of the home and of dairy barns and milkrooms.

Kill flies. Use space and surface sprays in and around the home. Use surface sprays and poisoned baits in and around farm buildings. (Electric grids and traps are effective fly-killing devices in some circumstances.)

In the pages that follow, fly control is discussed under these headings: Sanitation, Screens, Insecticides, Poisoned Baits, Manure Disposal, and Grids and Traps.

¹ *Musca domestica*.

SANITATION

Despite advances in the development of insecticides, sanitation continues to be the mainstay of house fly control in and around the home and on the farm.

Flies breed in places where garbage or filth accumulates. Find and eliminate such places. Clean up. Bury or otherwise dispose of dog, cat, and chicken excreta around the yard.

Make sure you have tight-fitting lids on garbage cans.

Do not let garbage accumulate in the open. Do not let it stand until it ferments; insist on frequent pickups. Burn it if it cannot be disposed of in any other way.

SCREENS

Well-fitting screens on windows and doors are essential for keeping flies out of homes, dairy barns, and milkrooms. See that screened doors swing outward.

In a humid climate, use screens of copper, aluminum, bronze, plastic, or one of the rust-resisting alloys. In a dry climate, you can use galvanized screens.

Screens with 14 meshes to the inch will keep out house flies, but 16-mesh screens will keep out some other insects also.

INSECTICIDES

To kill flies quickly inside the home, use an insecticide in a space spray (or in an aerosol). *Outside the house*, apply a surface, or residual, spray to garbage cans, screens, porches, door and window frames, edges of arches, and other places where flies gather.

A surface spray may also be used inside the home; but if a house is well screened, and a surface spray has been used outside, it is usually easier to kill flies indoors with a space spray.

To kill flies in and around farm buildings, apply a surface spray. Apply it to the inside and outside of stables, dairy barns, hog houses, poultry houses, and other buildings in which livestock are kept. (See precautions.)

Space Sprays

Several kinds of ready-to-use space sprays for killing flies inside the home may be purchased. Buy the best-grade sprays from a reputable dealer.

Look for space sprays of the following types:

1. Those that contain pyrethrins plus a synergist. (The synergist increases the effectiveness of the pyrethrins. Some of the synergists are piperonyl butoxide, *n*-propyl isome, and sesame oil.) Some sprays of this type also contain DDT, methoxychlor, or lindane.
2. Those that contain organic thiocyanates. Some sprays of this type also contain pyrethrins, DDT, methoxychlor, or lindane.
3. Liquefied-gas aerosols that contain the insecticides mentioned in 1 and 2.

To kill flies in a room, release a mist from a hand or power sprayer or from an aerosol "bomb" for a few seconds, and keep the room closed for an hour.

Surface Sprays

Surface sprays leave a residue that may be effective for several weeks. Flies are killed when they come in contact with the residue.

DDT, methoxychlor, chlordane, lindane, malathion, Diazinon, and Dow ET-57 are recommended for use as surface sprays. Of these, only methoxychlor is recommended for use *inside* dairy barns and milkrooms. Lindane, chlordane, malathion, Diazinon, and Dow ET-57 (barn-spray grade) are *not* recommended for complete residual coverage inside homes.

Apply the spray at the rate of 1 or 2 gallons to 1,000 square feet. Moisten the surface without causing runoff.

Around the home, apply the spray with a hand or power sprayer or a paintbrush.

In treating farm buildings, use a power, compressed-air, or knapsack sprayer. The choice depends on the size of the area to be treated.

DDT and Methoxychlor

You can buy oil solutions containing 5 percent of DDT or methoxychlor.

These insecticides are also available in the form of wettable powders and emulsifiable concentrates. Make a 2.5-percent suspension (wetable powder and water) or a 5-percent emulsion (emulsifiable concentrate and water). To make the suspension, mix 2 pounds of a 50-percent wettable powder with 5 gallons of water.² To make the emulsion, mix 1 gallon of a 25-percent emulsifiable concentrate with 4 gallons of water.²

Spraying walls and ceiling of a dairy barn with a truck-mounted power sprayer.

Chlordane

You can buy a 2-percent chlordane preparation that is ready to use when purchased. Or you can make a 2-percent emulsion by mixing 1 pint of a 50-percent emulsifiable concentrate with 3 gallons of water.²

Lindane

Make a 0.3-percent spray. Use one of the following mixtures: $\frac{1}{2}$ pound of a 25-percent wettable powder with 5 gallons of water; or 1 pint of a 20-percent emulsifiable concentrate with $8\frac{1}{2}$ gallons of water.

Malathion, Diazinon, and Dow ET-57

Apply as 1-percent emulsion or wettable-powder sprays. One pound of 25-percent wettable powder of either material, 12 ounces of 57-percent malathion emulsifiable concentrate or $1\frac{1}{2}$ pints of 25-percent Diazinon or Dow ET-57 emulsifiable concentrate to 5 gallons of water will give the desired concentration of insecticide.

Precautions

IN GENERAL.—Handle insecticides with care. Most of them are likely to poison people and animals if they are handled carelessly. . . . Avoid prolonged exposure of the skin to insecticides. . . . Avoid breathing large amounts of mist or dust. . . . Do not spray oil solutions near an open flame. . . . Do not contaminate feed, feed troughs, drinking fountains, and milking utensils.

SURFACE SPRAYS.—Do not use DDT or chlordane as a surface spray *inside* dairy barns or milkrooms. Do not use lindane, malathion, Diazinon, Dow ET-57, or chlordane for general residual spraying inside homes.

²If the product you buy contains a lower or higher percentage of the insecticide, use proportionately more or less of it.



E N E M I E S

POISONED BAITS

Poisoned baits control house flies in some places where sprays fail, particularly in unscreened dairy barns and in poultry houses. If properly applied, they can be used in most farm buildings without harming domestic animals. The baits described

Making a Bait

Try to buy a ready-to-use bait. If it is not available, buy malathion or Diazinon in the form of an emulsifiable concentrate or a wettable powder and make a bait.

Liquid Bait

Make a liquid bait by mixing an attractant—molasses, sirup, or sugar—and one of the poisons with water. The finished bait should contain 0.1 percent of insecticide and 10 percent of attractant. A bait mixed in accordance with the chart below will contain these percentages of insecticide and attractant.

Dry Bait

To make a dry sugar bait, take 1 pound of granulated sugar and add 3 tablespoonfuls of a 25-percent wettable powder—malathion or Diazinon. Add about $\frac{1}{4}$ teaspoonful of lampblack to color the sugar. Stir with a paddle until all the grains of sugar are coated with the poison and colored

here are not approved for use in homes, milkrooms, and restaurants.

The effective poisons are malathion, Diazinon, and Bayer L 13/59 (O,O-dimethyl trichlorohydroxyethyl phosphonate). Ready-to-use dry baits containing these poisons are on the market.

a dirty gray. Coloring the poisoned sugar with lampblack prevents mistaking it for ordinary sugar.

Cornmeal Bait

A cornmeal bait is recommended for use on moist surfaces, where a dry sugar bait would dissolve.

While stirring 1 pound of coarsely ground cornmeal, slowly add the following:

- 1 tablespoonful of peanut oil.
- 6 tablespoonfuls of a 25-percent wettable powder—malathion or Diazinon.
- 2 ounces of powdered sugar.

Stir with a paddle until all the meal particles are coated with the sugar and the wettable powder. Five minutes' stirring insures proper mixing of quantities of 1 to 5 pounds. Mixing of larger quantities by hand is not recommended.

Applying the Bait

Frequency

When flies are numerous, spread bait daily. When fewer flies are seen, spread bait once every 3 or 4 days. If flies again become numerous, increase frequency of application.

How and Where

If you buy a *ready-to-use dry bait*, apply it according to the directions on the container.

Apply *homemade liquid bait* with an ordinary sprinkling can. Plug about half the holes so that the bait will spread thinly in strips 4 to 6 inches wide on floors. If the floors are covered with dirt or litter, sprinkle the bait on sheets of tin, wood, paper, or other material.

For control in and around poultry houses, sprinkle the bait where poultry cannot reach it—under the cages, on window ledges, in feed rooms, on sacks or boards, and outside where flies gather. Be careful not to contaminate feed, water, or utensils.

Apply at the rate of 1 gallon to 1,000 square feet.

Apply *homemade, dry sugar bait* with a shaker-top can. Sprinkle thinly in narrow strips on floors, walkways, window sills, and other places

where flies gather, but not where it will contaminate animal feed, water, human food, or utensils. Use it only on dry, firm surfaces. On loose material, such as straw, the bait may fall where flies cannot get to it.

Apply at the rate of 3 tablespoonfuls per 1,000 square feet—or about $\frac{1}{4}$ pound for an average-size barn (one with 2,000 to 4,000 square feet of floor). Use larger quantities if flies are numerous.

Apply *cornmeal bait* at the rate of 2 to 4 ounces per 1,000 square feet in barns or sheds. A higher rate—4 to 8 ounces per 1,000 square feet—may be necessary in open places; the rate depends on the condition of the surface and on the abundance of flies.



Applying Dry Bait in a Poultry House

MANURE DISPOSAL

House fly control on the farm is made easier by proper disposal of the manure that accumulates in and around stables, dairy barns, pig-feeding lots, and poultry houses.

For maximum control, remove manure daily and scatter it on fields. Spread it thinly so that fly maggots will dry out and be killed.

When this is impracticable, store manure in boxes or pits, where flies cannot reach it. Boxes

or pits made of concrete are the most satisfactory.

Another method is to pile manure in a rectangular rick, preferably on a concrete base. Keep the rick packed down. Keep the sides vertical; use a spade to trim and pack. Dig a ditch around the rick and pour crude oil into it. Heat generated in the manure will kill many maggots and drive the rest to the surface. Many of those driven to the surface will drop into the oil-filled ditch and be killed.

GRIDS AND TRAPS

Electric grids mounted in the open, or attached to window and door screens, kill many flies but may not produce satisfactory control.

An electric grid consists of parallel wires, about $\frac{1}{4}$ inch apart, connected to a high-voltage, low-amperage circuit. Insects that try to pass between any two wires are electrocuted.

LIFE STAGES OF THE HOUSE FLY

The house fly, like all other flies, has four stages in its life cycle—egg, larva (or maggot), pupa, and adult.

The life cycle is completed in 12 to 30 days; the time required depends chiefly on the temperature. There may be as many as 12 generations a year.

A new generation begins with the laying of eggs by the female flies. A female may lay as many as 2,700 eggs in 30 days.

The eggs, usually laid in garbage or manure, hatch into larvae in 10 to 24 hours. The larvae feed on the material in which they hatch. They stay beneath the surface. When they reach full growth, 4 to 10 days after hatching, they are creamy white and about $\frac{1}{2}$ inch long.

Near the end of the larval period the larvae

crawl to the surface of the breeding material. If the surface is sufficiently dry, the larvae transform to pupae there. If the surface is too moist, the larvae crawl to a more suitable place and transform to pupae.

The pupal stage lasts 3 to 6 days in warm weather; it may last a month or more in cold weather. The pupal case is barrel shaped and about $\frac{3}{8}$ inch long. At first it is yellowish; later, dark brown. Within the case the pupa transforms to a fly.

When the pupal stage is completed, the fly pushes open the end of the pupal case and works its way out.

A few days after emerging from the pupal cases, the flies mate. The females usually start laying eggs 4 to 12 days after emerging.

PAINT-ON BAIT

Neither a dry bait nor a liquid bait gives good control of flies in animal pens in which the ground is trampled, littered, or muddy.

A paint-on bait usually gives good control in these places. It is applied with a paintbrush to suitable surfaces nearby, such as posts, railings, or board fences. Corn sirup, blackstrap molasses, or a thick water-and-sugar slurry containing 1 percent of malathion or Diazinon makes a satisfactory paint-on bait.

To prepare the bait, put 8 ounces ($\frac{1}{2}$ pint) of a 25-percent emulsifiable concentrate or 8 ounces ($\frac{1}{2}$ pound) of a 25-percent wettable powder in 1 gallon of attractant. Mix thoroughly with a paddle.

Apply the bait whenever flies become numerous. Paint or daub it on. If it is not destroyed by rain, one application is effective about a week.

If you apply bait to a fence around a pen, apply it only to the outside.

A fence around an average-size calf or pig pen can be adequately treated with 2 quarts of bait.

Precautions

Avoid getting poisoned-bait concentrate in the eyes or on the skin. If it is spilled on the skin, wash immediately with soap and water; if it is spilled on your clothing, change clothing immediately. . . . Wash your hands thoroughly after spreading bait. . . . Keep baits, and the poisons used in making them, where children, pets, and livestock cannot reach them.

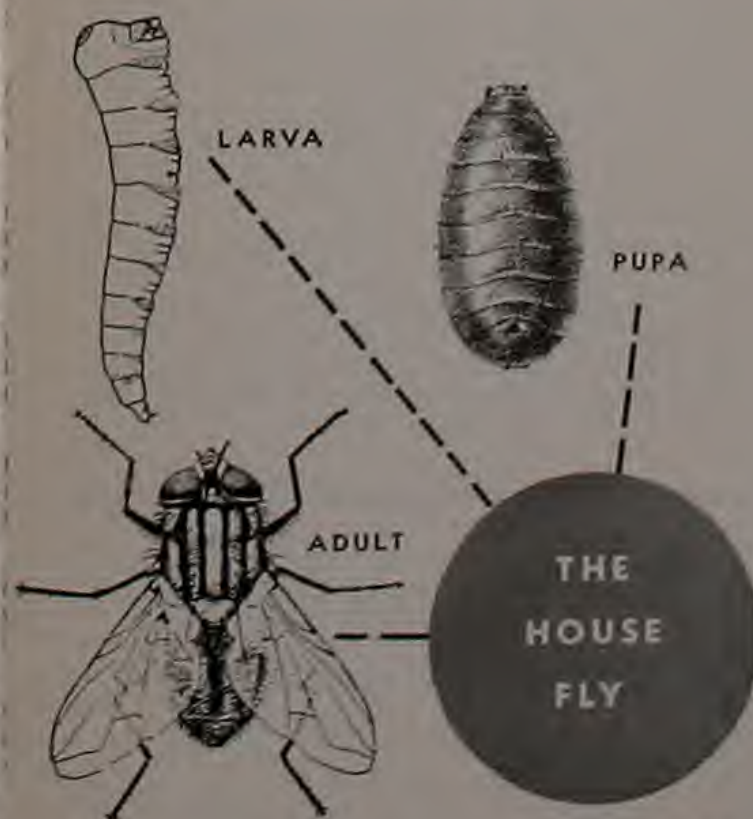
GUIDE . . . for Mixing a Liquid Bait

Water	Attractant	Insecticide	
		25-percent emulsifiable concentrate ¹	25-percent wettable powder ¹
Gallons	Pints	Tablespoonfuls	Tablespoonfuls
1	$\frac{3}{4}$	1	2
3	$2\frac{1}{4}$	3	6
10	$7\frac{1}{2}$	10	20

¹If you buy a product that contains a lower or higher percentage of poison, use proportionately more or less of it.

Resistance to DDT

For a few years after its introduction, DDT was widely used, and it produced spectacular control of house flies. Now, however, the flies are highly resistant to it in many areas. In these areas the flies cannot be effectively controlled with DDT or similar insecticides. If you live in an area where satisfactory fly control cannot be obtained with DDT sprays, use activated pyrethrum sprays or poisoned bait.



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Garbage Dumps and Packing Plants.—House flies that breed in municipal garbage dumps can be controlled by applying one of the poisoned baits discussed in this leaflet. Apply either a liquid or a dry bait. If a liquid bait is selected, apply it at the rate of 5 to 10 gallons to the acre. Apply dry bait at the rate of 5 to 10 pounds to the acre.

Flies that breed in wastes around vegetable- and fruit-packing plants can be controlled by spreading poisoned baits, spraying waste material with an insecticide, applying surface sprays outside the plant in places where flies gather, applying surface sprays inside the plant before packing operations begin, and using space sprays inside the plant after operations begin.

THIS PUBLICATION tells how to control the house fly around the home and on the farm. An important step is the elimination of the flies' breeding places. It may be that you have a house fly problem around your home but are unable to find breeding places nearby. What you should do depends on whether you live on a farm or in an urban community. If you live on a farm, look for breeding places around farm buildings. If you live in a town or city, clean up fly-breeding places on your property and report the problem to your local health officer. The flies may be coming from a packing plant or some other business establishment, or from a garbage dump. Such places can be the source of house fly invasions in homes, food stores, and restaurants several miles away.

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